

IN THE CLAIMS:

1. (Currently Amended) A process for preparing and screening an array of metal-ligand compositions comprising:

5 preparing an array of ~~polymerization mixtures~~ metal-ligand compositions in a ~~series~~ plurality of discrete reaction vessels contained by or within an integrated structure, ~~each polymerization mixture of the array comprising a~~
10 ~~polymerization monomer and a metal-ligand composition~~ wherein the plurality of different reaction vessels of the array contain different metal-ligand compositions and said preparing comprises delivering a metal-binding ligand and a dissolved, soluble metal precursor to each of the plurality of reaction vessels of the array which combine to form the metal-ligand composition, wherein said soluble metal precursor comprises a solublizing ligand and one or more of the metal-ligand compositions is formed without displacing said solublizing ligand;

15 preparing an array of polymerization mixtures by delivering a polymerization monomer to the metal-ligand compositions in the plurality of reaction vessels of the integrated structure;

subjecting the array of polymerization mixtures in the integrated structure to conditions conducive to the formation of a polymerization reaction product; and

screening ~~the~~ said array for a polymerization reaction product.

2. (Original) The process of claim 1 wherein the metal-ligand compositions comprise a cyclic structure having at least 5 ring members, one member being the metal of the soluble metal precursor.

3. (Original) The process of claim 1 wherein the metal-binding ligand is not bound to a solid material.

4. (Currently Amended) The process of claim 3 wherein the metal-binding ligand is delivered to the ~~series~~ plurality of discrete reaction vessels after the soluble metal precursor.

5. (Currently Amended) The process of claim 3 wherein the soluble metal precursor is delivered to the ~~series~~ plurality of discrete reaction vessels after the metal-binding ligand.

6. (Original) The process of claim 1 wherein the soluble metal precursor has a formula MR_n , wherein M is a transition metal, a lanthanide metal, an actinide metal, an alkali metal, an alkaline earth metal or a main group metal, R is a solublizing ligand, and n ranges from about 1 to about 8.

7. (Original) The process of claim 1 wherein the soluble metal precursor has a formula MR_nL_m , wherein M is a transition metal, a lanthanide metal, an actinide metal, an alkali metal, an alkaline earth metal or a main group metal, R is a solublizing ligand, L is a neutral solublizing ligand, n ranges from about 0 to about 8, and m ranges from about 0 to about 6, provided the sum of $n + m$ is at least 1.

8. (Original) The process of claim 1 wherein the soluble metal precursor has a formula $M_pR_{n'}L_m$, wherein M is a transition metal, a lanthanide metal, an actinide metal, an alkali metal, an alkaline earth metal or a main group metal, R is a solublizing ligand, L is a neutral solublizing ligand, p is greater than 1, n' and m' are each independently a number greater than 0, provided the sum of $n' + m'$ is at least 2.

9. (Currently Amended) The process of claim 1 wherein the soluble metal precursor ~~comprises~~ comprises a metal selected from Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Y, Zr, Nb, Mo, Ru, Rh, Pd, Ag, Cd, La, Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, U, Th, B, Al, Ga, Ti, In, Li, Na, K, Rb, Cs, Be, Mg, Ca, Sr, Ba, Ge, Sn, Pb, Sb, Bi or a combination thereof.

10. (Original) The process of claim 9 wherein the soluble metal precursor comprises one or more solublizing ligands independently selected from the group consisting of halogen, substituted or unsubstituted alkyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted cycloalkenyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted heterocycloalkyl,

substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl, alkoxy, aryloxy, hydroxy, boryl, silyl, hydride, thio, oxo, imido, sulfido, seleno, phosphino, amino, carboxylate, 1,3-dionate, oxalate, carbonate, nitrate, sulfate, perchlorate, sulfonate, phosphonate and combinations thereof.

Claims 11-13. (Canceled)

14. (Currently Amended) The process of claim 1 wherein, prior to ~~the screening reaction~~ subjecting the array of polymerization mixtures to conditions conducive to the formation of a polymerization reaction product, a reactant and an activator are delivered to at least one of the polymerization mixture mixtures in the array, the reactant being delivered before the activator.

15. (Currently Amended) The process of claim 1 wherein, prior to ~~the screening reaction~~ subjecting the array of polymerization mixtures to conditions conducive to the formation of a polymerization reaction product, a reactant and an activator are delivered to at least one of the polymerization mixture mixtures in the array, the reactant being delivered after the activator.

16. (Original) The process of claim 1 wherein each metal-binding ligand has a coordination number (CN) independently selected from the group consisting of 1, 2, 3 and 4.

17. (Original) The process of claim 1 wherein each metal-binding ligand has a charge independently selected from the group consisting of 0, -1, -2 and -3.

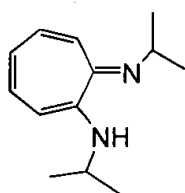
18. (Original) The process of claim 1 wherein each metal-binding ligand has a coordination number (CN) which is greater than its respective charge.

19. (Original) The process of claim 18 wherein each metal-binding ligand has a coordination number (CN) and a charge independently selected from the group consisting of:

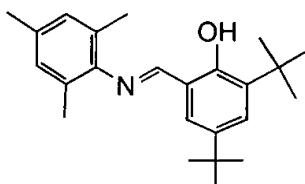
	<u>CN</u>	<u>Charge</u>
5	2	-2
	2	-1
	1	-1
	2	0
	3	-1
10	3	-2
	3	0
	4	0
	4	-1
	4	-2
	1	0.

20. (Original) The process of claim 1 wherein each metal-binding ligand has a coordination number (CN) which is less than its respective charge.

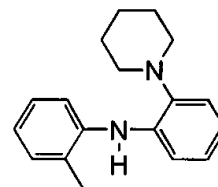
21. (Original) The process of claim 1 wherein each metal-binding ligand is independently selected from the group consisting of derivatives of the following:



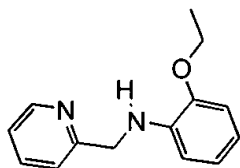
(2,-1)



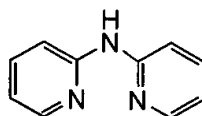
(2,-1)



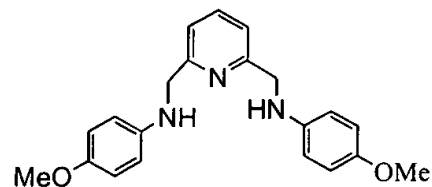
(2,-1)



(3,-1)



(3,-1)



(3,-2)

22. (Original) The process of claim 1 wherein the soluble metal precursor comprises a substituted alkyl solublizing ligand.

23. (Original) The process of claim 22 wherein the solublizing ligand is a trimethylsilyl-substituted alkyl.

24. (Original) The process of claim 22 wherein the solublizing ligand is selected from the group consisting of mono(trimethylsilyl)-methyl, bis(trimethylsilyl)methyl and tris(trimethylsilyl)-methyl.

25. (Original) The process of claim 1 wherein the soluble metal precursor comprises an alkoxy solublizing ligand.

26. (Original) The process of claim 25 wherein the solublizing ligand is tert-butoxy.

27. (Original) The process of claim 1 wherein the soluble metal precursor comprises an aryloxy solublizing ligand.

28. (Original) The process of claim 27 wherein the solublizing ligand is 2,6-bis(tert-butyl)phenoxy.

29. (Original) The process of claim 1 wherein the soluble metal precursor comprises an amino solublizing ligand.

30. (Original) The process of claim 29 wherein the solublizing ligand is N,N-bis(trimethylsilyl)amino or N,N-diethylamino.

31. (Original) The process of claim 1 wherein the soluble metal precursor comprises a 1,3-dionate solublizing ligand.

32. (Original) The process of claim 31 wherein the solublizing ligand is 2,2,6,6-tetramethyl-3,5-heptanedionate.

33. (Original) The process of claim 31 wherein the solublizing ligand is 2,4-pentanedionate.

34. (Original) The process of claim 1 wherein the soluble metal precursor comprises a carboxylate solublizing ligand.

35. (Original) The process of claim 34 wherein the solublizing ligand is trifluoroacetate.

36. (Original) The process of claim 1 wherein the soluble metal precursor comprises a substituted or unsubstituted cycloalkenyl solublizing ligand.

37. (Original) The process of claim 36 wherein the solublizing ligand is cyclopentadienyl.

38. (Original) The process of claim 1 wherein the soluble metal precursor has the formula MR_nL_m , wherein M is a transition metal, a lanthanide metal, an actinide metal, an alkali metal, an alkaline earth metal or a main group metal, R is a solublizing ligand, L is a neutral solublizing ligand, n ranges from about 0 to about 8, and m ranges from about 0 to about 6, provided the sum of $n + m$ is at least 1, and further wherein said soluble metal precursor is negatively charged, and the metal precursor solution additionally comprising a counter cation.

39. (Original) The process of claim 1 wherein the soluble metal precursor has the formula LnR_3 , wherein R is independently selected from the group consisting of halo, substituted or unsubstituted alkyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted heterocycloalkyl, substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl, alkoxy, aryloxy, hydroxy, boryl, silyl, hydride, thio, seleno, phosphino, amino, carboxylate, dionate, oxalate, carbonate, nitrate, sulfate, perchlorate, sulfonate, phosphonate and combinations thereof, and wherein Ln is selected from the group consisting of La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu or a combination thereof.

40. (Original) The process of claim 1 wherein the soluble metal precursor comprises more than one solublizing ligand, each being the same.

41. (Currently Amended) The process of claim 40 wherein the solublizing ligand is selected from the group consisting of halo, hydride, substituted or unsubstituted alkyl, substituted or unsubstituted ~~cycloalkyl~~ cycloalkyl, substituted or unsubstituted aryl, substituted or unsubstituted heteroalkyl, alkoxy, aryloxy, dionate, carboxylate and amino.

42. (Original) The process of claim 1 wherein the soluble metal precursor has the formula MR_nL_m , wherein M is a transition metal, R is a solublizing ligand, L is a neutral solublizing ligand, n ranges from about 0 to 7, m ranges from about 1 to 6, and n+m ranges from about 1 to 7.

43. (Original) The process of claim 1 wherein the soluble metal precursor has the formula MR_nL_m , wherein M is a lanthanide metal, R is a solublizing ligand, L is a neutral solublizing ligand, n ranges from about 0 to 7, m ranges from about 1 to 6, and n+m ranges from about 1 to about 9.

44. (Original) The process of claim 1 wherein the soluble metal precursor has the formula $M_pR_nL_{m'}$, wherein M is a transition metal, R is a solublizing ligand, L is a neutral solublizing ligand, p is at least about 2, n' ranges from 0 to 7, m' ranges from 1 to 6, and n'+m' ranges from about 2 to about 7.

45. (Original) The process of claim 1 wherein the soluble metal precursor has the formula $M_pR_nL_{m'}$, wherein M is a lanthanide metal, R is a solublizing ligand, L is a neutral solublizing ligand, p is at least about 2, n' ranges from 0 to 7, m' ranges from 1 to 6, and n'+m' ranges from about 2 to about 9.

46. (Original) The process of claim 1 wherein the soluble metal precursor comprises one or more neutral solublizing ligands, L, independently selected from the group consisting of carbon monoxide, isocyanide, nitrous oxide, alkylnitrile, aryl nitrile, PX_3 , NX_3 , OX_2 , SX_2 , SeX_2 , OPX_3 , ONX_3 , SPX_3 , OSX_2 , $OSOX_2$, X_2N-NX_2 , $XS-SX$, $XO-OX$, η^6 -arene, olefin, alkenyl, cycloalkenyl, alkynyl and combinations thereof, wherein each X is independently selected from the

group consisting of substituted or unsubstituted alkyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted heterocycloalkyl, substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl, silyl and combinations thereof.

47. (Currently Amended) The process of claim 1 wherein prior to the polymerization reaction subjecting the array of polymerization mixtures to conditions conducive to the formation of a polymerization reaction product, one or more of the polymerization mixtures is activated.

48. (Original) The process of claim 47 wherein activation is achieved by the addition of one or more activators independently selected from the group consisting of methylalumoxane, trialkylaluminum, dialkylaluminumhydride, diethylaluminummethoxide, diethylaluminumchloride, dibutylmagnesium, dialkylzinc, trialkylboron, AgBF_4 , AgBPh_4 , NaBAr_4 , AgBAr_4 , $[\text{H}(\text{OEt}_2)]^+[\text{BAr}_4]^-$, $[\text{H}(\text{OEt}_2)]^+[\text{B}(\text{C}_6\text{F}_5)_4]^-$, $\text{B}(\text{C}_6\text{F}_5)_3$, $\text{PhNMe}_2\text{HB}(\text{C}_6\text{F}_5)_4$ and $\text{Ph}_3\text{CB}(\text{C}_6\text{F}_5)_4$.

49. (Original) The process of claim 48 wherein the activator is methylalumoxane, $\text{B}(\text{C}_6\text{F}_5)_3$, $\text{PhNMe}_2\text{HB}(\text{C}_6\text{F}_5)_4$ or $\text{Ph}_3\text{CB}(\text{C}_6\text{F}_5)_4$.

50. (Original) The process of claim 48 wherein the trialkyl-aluminum is selected from the group consisting of trimethyl-aluminum, triethylaluminum and tri(isobutyl)aluminum.

51. (Original) The process of claim 48 wherein activation is achieved by the addition of a trialkylaluminum and $\text{B}(\text{C}_6\text{F}_5)_3$.

52. (Original) The process of claim 48 wherein activation is achieved by the addition of a trialkylaluminum and $\text{PhNMe}_2\text{HB}(\text{C}_6\text{F}_5)_4$.

53. (Original) The process of claim 1 wherein the soluble metal precursor has the general formula MR_n , wherein M is a metal atom selected from the group consisting of a transition metal, a lanthanide metal or a main group metal, R is one or more solublizing ligands selected from the group consisting of mesityl and 2,4-petanedionate, and n ranges from about 2 to about 3.

54. (Original) The process of claim 1 wherein one or more of the metal-ligand compositions is screened for homogeneous catalytic activity.

55. (Original) The process of claim 54 wherein one or more of the metal-ligand compositions is screened for homogeneous catalytic activity in an olefin polymerization reaction.

56. (Currently Amended) The process of claim 1 wherein the polymerization reaction product is screened for a property of interest selected from the group consisting of electrical, thermal, mechanical, morphological, optical, magnetic or chemical.

57. (Currently Amended) The process of claim 1 wherein the polymerization reaction product is ~~screen~~ screened for a property of interest by a method selected from the group consisting of infrared spectroscopy, infrared imaging, liquid chromatography, light scattering, polymer structural testing, polymer melt flow testing, polymer property testing, Fourier transform infrared spectroscopy, thin layer chromatography, solid phase staining, rapid gel permeation chromatography, nuclear magnetic resonance spectroscopy, depolarized light scattering, rapid thermal analysis, gas composition–mass spectrometry, thermal measurement, X-ray fluorescence, reactant consumption or reactant uptake, gravimetric measurement of product yield and liquid composition–mass spectrometry.

58. (Original) The process of claim 1 wherein the array comprises at least about 8 different ligands.

59. (Original) The process of claim 1 wherein the array comprises at least about 15 different ligands.

60. (Original) The process of claim 1 wherein the array comprises at least about 23 different ligands.

61. (Original) The process of claim 1 wherein the array comprises at least about 40 different ligands.

62. (Original) The process of claim 1 wherein the array comprises at least about 80 different ligands.

63. (Original) The process of claim 1 wherein the array comprises at least about 200 different ligands.

64. (Original) The process of claim 1 wherein the array comprises at least about 1000 different ligands.

65. (Original) The process of claim 1 wherein the soluble metal precursor has the formula ML , MR_nL_m or $M_pR_nL_m$, wherein M is a metal, R is a solublizing ligand, and L is a neutral solublizing ligand.

66. (Original) The process of claim 65 wherein L is selected from the groups consisting of alkyl nitrile, cyclic olefin, bicyclic olefin, cycloalkenyl, bicycloalkenyl, alkynyl, η^6 -arene, or a combination thereof.

67. (Original) The process of claim 66 wherein L is selected from the group consisting of acetonitrile, cyclooctene, norbornene, 1,5-cyclooctadiene, cycloheptatriene, cyclooctatetraene, norbornadiene, η^6 -*p*-cymene, or a combination thereof.

68. (Original) The process of claim 1 wherein the soluble metal precursor is a dimer, a trimer, or higher order complex.

69. (Original) The process of claim 1 wherein the soluble metal precursor is selected from the group consisting of $Ti(CH_2Ph)_4$, $Zr(CH_2Ph)_4$, $Hf(CH_2Ph)_4$, $V(mes)_3(THF)$, $Ta(CH_3)_3(Cl)_2$, $Nb(CH_3)_3(Cl)_2$, $Ta(NMe_2)_3(Cl)_2$, $Cr[(CH(SiMe_3)_2)_3]$, $Cr(mesityl)_2(THF)$, $Cr(mesityl)_2(THF)_3$, $[Fe(mesityl)_2]_2$, $[Co(mesityl)_2]_2$,
5 $Co(mesityl)_3Li(THF)_4$, $[Mn(mesityl)_2]_3$, $Cr(mesityl)_3$, $Sc(CH(SiMe_3)_2)_3$, $Y(CH(SiMe_3)_2)_3$, $Ln(CH(SiMe_3)_2)_3$, $Sc(O(2,6-(tBu)_2C_6H_3))_3$, $Y(O(2,6-(tBu)_2C_6H_3))_3$, $Ln(O(2,6-(tBu)_2C_6H_3))_3$, $Sc(O(2,6-(tBu)_24-Me-C_6H_3))_3$, $Y(O(2,6-(tBu)_24-Me-C_6H_3))_3$, $Ln(O(2,6-(tBu)_24-Me-C_6H_3))_3$, $Sc(N(SiMe_3)_2)_3$, $Y(N(SiMe_3)_2)_3$, $Ln(N(SiMe_3)_2)_3$,
10 $Ni(acac)_2$, $Pd(acac)_2$, $Co(acac)_3$, $Fe(acac)_3$, $Fe(acac)_2$, $Mn(acac)_2$, $Cr(acac)_2$, $Cr(acac)_3$, $V(acac)_3$, $V(O)(acac)_3$, $Ni(TFA)_2$, $Fe(TFA)_2$, $Fe(TFA)_3$, $Co(TFA)_2$,

- Mn(TFA)₂, [Cr(TFA)₂]₂, Cr(TFA)₃, V(TFA)₃, CrCl₃(THF)₃, VCl₃(THF)₃,
(COD)PdMeCl, [(cyclooctene)PdMeCl]₂, (COD)PdMeOTf, [(allyl)PdCl]₂,
((CH₃)₃CN)₂PdCl₂, [(allyl)NiCl]₂, [(CH₃O₂CC₃H₄)NiBr]₂, [(allyl)NiTFA]₂, (p-cymene)-
Ru(TFA)₂(CH₃CN), (p-cymene)Ru(mesityl)(TFA), (PPh₃)₄RuH₂, (PPh₃)₂Ni(Ph)Cl,
15 (PPh₃)₄Ni, (COD)₂Ni, (py)₂Ni(CH₂SiMe₃)₂, Fe(C(SiMe₃)₃)₂, Co(C(SiMe₃)₃)₂,
Mn(C(SiMe₃)₃)₂, Ti(CH₂CMe₃)₄, Zr(CH₂CMe₃)₄, Hf(CH₂CMe₃)₄, TiCl₄, Ti(NMe₂)₄,
Zr(NMe₂)₄, Hf(NMe₂)₄, Zr(NEt₂)₄, Ti(NMe₂)₂Cl₂, Zr(N(SiMe₃)₂)₂Cl₂,
Hf(N(SiMe₃)₂)₂Cl₂, Zr(TFA)₄, Hf(TFA)₄, Ti(TFA)₂Cl₂, TiCl₃(THF)₃,
V(CH(SiMe₃)₂)₃(THF), V(O-2,6-iPr-C₆H₃)₄Li(THF), Ta(NMe₂)₅, (TMEDA)NiMe₂,
20 (TMEDA)PdMe₂, Ta(CH₂CMe₃)₂Cl₃, TaPh₅, Co(Ph₃P)₃CH₃, [Co(Ph₃P)₃H]₂N₂, and
[Ni(PCy₃)₂]₂N₂, or a combination thereof, wherein Ln is selected from the group
consisting of La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu or a
combination thereof.

70. (Original) The process of claim 1 further comprising delivering a metal-binding ligand which is not bound to a solid support to the plurality of discrete reaction vessels to form a metal-ligand composition, the ligand being combined with a deprotonating agent.

71. (Original) The process of claim 70 wherein the deprotonating agent is selected from the group consisting of LiN(SiMe₃)₂, NaN(SiMe₃)₂, KN(SiMe₃)₂, BuLi, or KCH₂Ph.

Claims 72-89. (Canceled)

90. (New) A process for preparing and screening an array of metal-ligand compositions comprising:

- 5 preparing an array of metal-ligand compositions in a plurality of discrete reaction vessels contained by or within an integrated structure, wherein the plurality of reaction vessels of the array contain different metal-ligand compositions and said preparing comprises delivering a metal-binding ligand and a dissolved, soluble metal precursor to each of the plurality of reaction vessels of the array which combine to form the metal-ligand composition, wherein said soluble metal precursor comprises a solubilizing ligand and formation of one or

more of the metal-ligand compositions is accompanied by the displacement of said solublizing ligand;

5 preparing an array of polymerization mixtures by delivering a polymerization monomer to the metal-ligand compositions in the plurality of reaction vessels of the integrated structure;

subjecting the array of polymerization mixtures in the integrated structure to conditions conducive to the formation of a polymerization reaction product; and

10 screening said array for a polymerization reaction product, wherein, prior to subjecting the array of polymerization mixtures to said conditions conducive to the formation of a polymerization reaction product, the displaced ligands are converted to a form which does not significantly inhibit the polymerization reaction.

91. (New) The process of claim 90 wherein one or more of the displaced ligands is converted to a form which does not significantly inhibit the polymerization reaction prior to preparing an array of polymerization mixtures.

92. (New) The process of claim 90 wherein the metal-binding ligand is not bound to a solid material.

93. (New) The process of claim 92 wherein the metal-binding ligand is delivered to the plurality of discrete reaction vessels after the soluble metal precursor.

94. (New) The process of claim 92 wherein the soluble metal precursor is delivered to the plurality of discrete reaction vessels after the metal-binding ligand.

95. (New) The process of claim 90 wherein the soluble metal precursor has a formula MR_n , wherein M is a transition metal, a lanthanide metal, an actinide metal, an alkali metal, an alkaline earth metal or a main group metal, R is a solublizing ligand, and n ranges from about 1 to about 8.

96. (New) The process of claim 90 wherein the soluble metal precursor has a formula MR_nL_m , wherein M is a transition metal, a lanthanide metal, an actinide metal, an alkali metal, an alkaline earth metal or a main group metal, R is a solublizing ligand, L is a neutral solublizing ligand, n ranges from about 0 to about 8, and m ranges from about 0 to about 6, provided the sum of $n + m$ is at least 1.

97. (New) The process of claim 90 wherein the soluble metal precursor has a formula $M_pR_nL_{m'}$, wherein M is a transition metal, a lanthanide metal, an actinide metal, an alkali metal, an alkaline earth metal or a main group metal, R is a solublizing ligand, L is a neutral solublizing ligand, p is greater than 1, n' and m' are each independently a number greater than 0, provided the sum of $n' + m'$ is at least 2.

98. (New) The process of claim 90 wherein the soluble metal precursor comprises a metal selected from Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Y, Zr, Nb, Mo, Ru, Rh, Pd, Ag, Cd, La, Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, U, Th, B, Al, Ga, In, Li, Na, K, Rb, Cs, Be, Mg, Ca, Sr, Ba, Ge, Sn, Pb, Sb, Bi or a combination thereof.

99. (New) The process of claim 98 wherein the soluble metal precursor comprises one or more solublizing ligands independently selected from the group consisting of halogen, substituted or unsubstituted alkyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted cycloalkenyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted heterocycloalkyl, substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl, alkoxy, aryloxy, hydroxy, boryl, silyl, hydride, thio, oxo, imido, sulfido, seleno, phosphino, amino, carboxylate, 1,3-dionate, oxalate, carbonate, nitrate, sulfate, perchlorate, sulfonate, phosphonate and combinations thereof.

100. (New) The process of claim 90 wherein, prior to subjecting the array of polymerization mixtures to conditions conducive to the formation of a polymerization reaction product, a reactant and an activator are delivered to at least one of the polymerization mixtures in the array, the reactant being delivered before the activator.

101. (New) The process of claim 90 wherein, prior to subjecting the array of polymerization mixtures to conditions conducive to the formation of a polymerization reaction product, a reactant and an activator are delivered to at least one of the polymerization mixtures in the array, the reactant being delivered
5 after the activator.

102. (New) The process of claim 90 wherein each metal-binding ligand has a coordination number (CN) which is greater than the absolute value of its respective charge.

103. (New) The process of claim 90 wherein each metal-binding ligand has a coordination number (CN) which is less than the absolute value of its respective charge.

104. (New) The process of claim 90 wherein the soluble metal precursor has the formula MR_nL_m , wherein M is a transition metal, a lanthanide metal, an actinide metal, an alkali metal, an alkaline earth metal or a main group metal, R is a solublizing ligand, L is a neutral solublizing ligand, n ranges from about 0 to
5 about 8, and m ranges from about 0 to about 6, provided the sum of $n + m$ is at least 1, and further wherein said soluble metal precursor is negatively charged, and the metal precursor solution additionally comprising a counter cation.

105. (New) The process of claim 90 wherein the soluble metal precursor has the formula LnR_3 , wherein R is independently selected from the group consisting of halo, substituted or unsubstituted alkyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted
5 heterocycloalkyl, substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl, alkoxy, aryloxy, hydroxy, boryl, silyl, hydride, thio, seleno, phosphino, amino, carboxylate, dionate, oxalate, carbonate, nitrate, sulfate, perchlorate, sulfonate, phosphonate and combinations thereof, and wherein Ln is selected
10 from the group consisting of La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu or a combination thereof.

106. (New) The process of claim 90 wherein the soluble metal precursor comprises more than one solublizing ligand, each being the same.

107. (New) The process of claim 106 wherein the solublizing ligand is selected from the group consisting of halo, hydride, substituted or unsubstituted alkyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted aryl, substituted or unsubstituted heteroalkyl, alkoxy, aryloxy, dionate, carboxylate and amino.

108. (New) The process of claim 90 wherein the soluble metal precursor has the formula MR_nL_m , wherein M is a transition metal, R is a solublizing ligand, L is a neutral solublizing ligand, n ranges from about 0 to 7, m ranges from about 1 to 6, and n+m ranges from about 1 to 7.

109. (New) The process of claim 90 wherein the soluble metal precursor has the formula MR_nL_m , wherein M is a lanthanide metal, R is a solublizing ligand, L is a neutral solublizing ligand, n ranges from about 0 to 7, m ranges from about 1 to 6, and n+m ranges from about 1 to about 9.

110. (New) The process of claim 90 wherein the soluble metal precursor has the formula $M_pR_{n'}L_{m'}$, wherein M is a transition metal, R is a solublizing ligand, L is a neutral solublizing ligand, p is at least about 2, n' ranges from 0 to 7, m' ranges from 1 to 6, and n'+m' ranges from about 2 to about 7.

111. (New) The process of claim 90 wherein the soluble metal precursor has the formula $M_pR_{n'}L_{m'}$, wherein M is a lanthanide metal, R is a solublizing ligand, L is a neutral solublizing ligand, p is at least about 2, n' ranges from 0 to 7, m' ranges from 1 to 6, and n'+m' ranges from about 2 to about 9.

112. (New) The process of claim 90 wherein the soluble metal precursor comprises one or more neutral solublizing ligands, L, independently selected from the group consisting of carbon monoxide, isocyanide, nitrous oxide, alkylnitrile, aryl nitrile, PX_3 , NX_3 , OX_2 , SX_2 , SeX_2 , OPX_3 , ONX_3 , SPX_3 , OSX_2 , $OSOX_2$, X_2N-NX_2 , $XS-SX$, $XO-OX$, η^6 -arene, olefin, alkenyl, cycloalkenyl, alkynyl and combinations thereof, wherein each X is independently selected from the

group consisting of substituted or unsubstituted alkyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted heterocycloalkyl, substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl, silyl and combinations thereof.

113. (New) The process of claim 90 wherein prior to subjecting the array of polymerization mixtures to conditions conducive to the formation of a polymerization reaction product, one or more of the polymerization mixtures is activated.

114. (New) The process of claim 113 wherein activation is achieved by the addition of one or more activators independently selected from the group consisting of methylalumoxane, trialkylaluminum, dialkylaluminumhydride, diethylaluminummethoxide, diethylaluminumchloride, dibutylmagnesium, dialkylzinc, trialkylboron, AgBF_4 , AgBPh_4 , NaBAr_4 , AgBAr_4 , $[\text{H}(\text{OEt}_2)]^+[\text{BAr}_4]^-$, $[\text{H}(\text{OEt}_2)]^+[\text{B}(\text{C}_6\text{F}_5)_4]^-$, $\text{B}(\text{C}_6\text{F}_5)_3$, $\text{PhNMe}_2\text{HB}(\text{C}_6\text{F}_5)_4$ and $\text{Ph}_3\text{CB}(\text{C}_6\text{F}_5)_4$.

115. (New) The process of claim 90 wherein the soluble metal precursor has the general formula MR_n , wherein M is a metal atom selected from the group consisting of a transition metal, a lanthanide metal or a main group metal, R is one or more solublizing ligands selected from the group consisting of mesityl and 2,4-petanedionate, and n ranges from about 2 to about 3.

116. (New) The process of claim 90 wherein one or more of the metal-ligand compositions is screened for homogeneous catalytic activity.

117. (New) The process of claim 116 wherein one or more of the metal-ligand compositions is screened for homogeneous catalytic activity in an olefin polymerization reaction.

118. (New) The process of claim 90 wherein the polymerization reaction product is screened for a property of interest selected from the group consisting of electrical, thermal, mechanical, morphological, optical, magnetic or chemical.

119. (New) The process of claim 90 wherein the polymerization reaction product is screened for a property of interest by a method selected from the group consisting of infrared spectroscopy, infrared imaging, liquid chromatography, light scattering, polymer structural testing, polymer melt flow testing, polymer property testing, Fourier transform infrared spectroscopy, thin layer chromatography, solid phase staining, rapid gel permeation chromatography, nuclear magnetic resonance spectroscopy, depolarized light scattering, rapid thermal analysis, gas composition–mass spectrometry, thermal measurement, X-ray fluorescence, reactant consumption or reactant uptake, gravimetric measurement of product yield and liquid composition–mass spectrometry.

120. (New) The process of claim 90 wherein the array comprises at least about 80 different ligands.

121. (New) The process of claim 90 wherein the array comprises at least about 200 different ligands.

122. (New) The process of claim 90 further comprising delivering a metal-binding ligand which is not bound to a solid support to the plurality of discrete reaction vessels to form a metal-ligand composition, the ligand being combined with a deprotonating agent.